



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,014	04/03/2001	Chun-Chi Wang	4006-118	6473

7590

11/19/2003

LOWE HAUPTMAN GOPSTEIN GILMAN & PERNER, LLP  
Suite 310  
1700 Diagonal Road  
Alexandria, VA 22314

EXAMINER

FOONG, SUK SAN

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/824,014

Applicant(s)

WANG ET AL.

Examiner

Suk-San Foong

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3, 6, 9-14 and 17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 9-14 and 17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some c) ☐ None of:
- 1 ☒ Certified copies of the priority documents have been received.
- 2 ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
- 3 ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 103***

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-3, 5, 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh et al. ('741) in combination with Andrews et al. ('709), Sakai et al. ('263), Lee ('355) and Wolf.

Walsh et al. is relied on for the teachings discussed in the rejections of paragraph 6 of the Office Action mailed on 5/2/03.

Walsh et al. does not teach performing a wet etching step to etch the oxide layer until the first silicon nitride layer above the edge of the shallow trench is about exposed; as recited in claim 1, lines 5-6.

Andrews et al. is relied on for the teachings discussed in the rejections of paragraph 6 of the Office Action mailed on 5/2/03 as providing motivation to enable the step of etching oxide layer 40 to expose underlying first silicon nitride layer 30 of Walsh et al. to be performed.

The combination process does not disclose etching an exposed portion of the oxide layer by dry etching process.

Sakai et al. is relied on for the teachings discussed in the rejections of paragraph 6 of the Office Action mailed on 5/2/03 as providing motivation to enable removal of a portion of exposed oxide layer 40 to expose the underlying silicon nitride layer in the combination process and obtain further advantage of preventing formation of depressions at the edge portion of the trench type element isolation 11, thereby causing no imperfection in device characteristics (Sakai et al., Col. 12, lines 45-49).

The combination process does not disclose the step as recited in claim 1, lines 17-19.

Lee is relied on for the teachings discussed in the rejections of paragraph 6 of the Office Action mailed on 5/2/03 as providing motivation to enable the step of removing remaining portions of first silicon nitride layer 30 and second silicon nitride layer 50 and thus removal of the remaining portion of oxide layer 40 of the combination process to be performed.

The combination process does not disclose etching second silicon nitride layer by dry etching.

Wolf is relied on for the teachings discussed in the rejections of paragraph 7 of the Office Action mailed on 5/2/03 as providing motivation to enable the step of etching a portion of second silicon nitride layer 50 of the combination process to be performed.

In regard to the dry etching step, they dry etching steps of the combination process are encompassed by "a dry etching step." Note that on instant page 8, lines 15-17, that a portion of the materials "is removed by the etch, such as dry etching, until the silicon nitride layer 204 underlying is about exposed, as shown in FIG. 12."

4. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. ('263) in combination with Lee ('355).

Sakai et al. is relied on for the teachings discussed in the rejections of paragraph 8 of the Office Action mailed on 5/2/03.

Sakai et al. does not teach performing a wet etching step to etch the oxide layer until the first silicon nitride layer above the edge of the shallow trench is about exposed.

Sakai et al. does not teach the step as recited in claim 9, lines 12-13.

Lee is relied on for the teachings discussed in the rejections of paragraph 8 of the Office Action mailed on 5/2/03 as providing motivation to enable the steps of removing remaining portions of first silicon nitride layer 3 and, thus, the remaining portion of oxide layer 11 of the Sakai et al. to be performed.

In Fig. 6 of Sakai et al., silicon nitride film 2D (Fig. 6) is exposed and thus the nitride film 2D is completely removed and thus removing the remaining oxide layer in the process of the combination.

***Response to Arguments***

5. Applicant argues that the combination of Walsh et al., Andrews et al. and Sakai et al. does disclose that (ii) the oxide layer between the first and second silicon nitride layers is removed while the first and second silicon nitride layers are removed. However, Walsh et al. and Andrews et al. are not relied for that teaching. In the process of the combination, Lee is relied on for the teachings of removing the silicon nitride layers by wet etching and, thereby, removing the remaining portion of the oxide layer.
6. Applicant argues that neither Walsh et al., Andrews et al. nor Sakai et al. discloses the advantages as in the instant invention. However, it is not necessary for the references to disclose that the process of the references is performed to achieve the same goals as applicant or to obtain the same advantages recognized by applicant. It is sufficient that the process suggested by the reference alone or in combination with the remaining references is encompassed by the instant claims.
7. It is agreed that the process of Sakai et al. differs from the invention. However, the reference <sup>is</sup> relied on as containing certain teachings and the additional teachings <sup>do</sup> not negate those relied on.
8. Applicant argues that Lee does not disclose removing exposed portion of the second silicon nitride layer and the oxide layer beneath the exposed portion of the second silicon nitride layer by a dry etching method. However, Lee is not relied on for this teaching but instead Lee is

relied on for the teachings of removing the silicon nitride layers by wet etching and, thereby, removing the remaining portion of the oxide layer.

9. Applicant argues that Wolf does not teach a dry etching process to etch silicon nitride layers and oxide layers. However, Wolf is not relied on for dry etching oxide layers. Furthermore, Wolf also teaches etching silicon oxide layers by dry etching method (p. 555).

10. Applicant argues that the references do not disclose that only the nitride layer above the edge of the shallow trench is exposed. However, the claims are not so limited.

11. Applicant's remaining arguments are addressed in the statements of the rejections above.

### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



November 14, 2003

  
George Pourson  
Primary Examiner  
Art Unit 2823